

<p align="center">NATIONAL AERONAUTICS AND SPACE ADMINISTRATION RESEARCH AND TECHNOLOGY RESUME</p>
<p>TITLE</p> <p align="center">Studies of Extended Planetary Atmospheres (NAGW-596)</p>
<p>PERFORMING ORGANIZATION</p> <p align="center">Lunar and Planetary Laboratory The University of Arizona Tucson, AZ 85721</p>
<p>INVESTIGATOR'S NAME</p> <p align="center">Donald M. Hunten</p>
<p>DESCRIPTION (a. Brief statement on strategy of investigation; b. Progress and accomplishments of prior year; c. What will be accomplished this year, as well as how and why; and d. Summary bibliography)</p> <p>a. Spectroscopic observations of gases and plasmas in the Jupiter system, and related phenomena such as the recently-discovered sodium atmospheres of Mercury and the Moon. Observations of other planets as opportunities arise.</p> <p>b. Cunningham's work on Jupiter spectroscopy is complete. The optical thickness of the ammonia cloud increases from about 3 in the morning to 6 at sunset. This effect seems to be due to the combination of internal heat flow and a convective region heated at the top, giving strong convection at night and none during the day. Near-simultaneous methane data are of poor quality, but are consistent with this picture.</p> <p>Schneider's work on the sodium environment of Io is also complete. The eclipse data extend to nearly 10 Io radii and nicely match the densities in the outer regions (to ~100 Io radii) obtained from the intensity scattered in the D lines. Another data set shows very fast jets of sodium (up to 100 km/sec), frequently tilted out of the orbital plane. We seem to be seeing neutralized ions, not from the torus itself but from atmospheric sodium ionized and then quickly neutralized.</p> <p>The data set on Mercurian sodium has been augmented, and supplemented by IR reflectance spectra obtained at the IRTF. They show Christiansen peaks that are diagnostic of surface composition.</p> <p>Lunar sodium has been observed; the scale height is around 60 km, as expected, but the density is very small, 1% of the Mercury value.</p> <p>Data have been taken of the night side of Venus, searching for auroral emission at 6300 A and for lightning flashes at 7774 A. The extensive data processing needed to remove scattered light from the day side is about to begin.</p> <p>Water vapor on Mars has been mapped in a collaborative program with a group at GSFC observing ozone by heterodyne spectroscopy.</p> <p>c. Analysis (A. Tyler) of the accumulated data on Mercurian sodium, seeking evidence of spatial and temporal variations with due account for seeing quality.</p> <p>Further work on sodium far from Io is planned, in collaboration with R.A. Brown and N. Schneider.</p> <p>Further observations of lunar sodium, mainly in connection with other observations.</p> <p>Analysis of the existing data on Venus aurora and lightning, and Mars water vapor (B. Rizk). Possible survey of Venus water vapor.</p> <p>Occultations will be observed as opportunities arise.</p>

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